Bridging data-driven and model-based approaches for process fault diagnosis and health monitoring: A review of researches and future challenges

Titre	Bridging data-driven and model-based approaches for process fault diagnosis and health monitoring: A review of researches and future challenges
Type de publication	Article de revue
Auteur	Tidriri, Khaoula [1], Chatti, Nizar [2], Verron, Sylvain [3], Tiplica, Téodor [4]
Pays	Pays-Bas
Editeur	Elsevier
Ville	Amsterdam
Type	Article scientifique dans une revue à comité de lecture
Année	2016
Langue	Anglais
Date	16 Sept. 2016
Pagination	63-81
Volume	42
Titre de la revue	Annual Reviews in Control
ISSN	1367-5788
Mots-clés	Data-driven methods [5], fault detection [6], fault diagnosis [7], Hybrid methods [8], Model-based methods [9]
Résumé en anglais	Fault Diagnosis and Health Monitoring (FD-HM) for modern control systems have been an active area of research over the last few years. Model-based FD-HM computational approaches have been extensively developed to detect and locate faults by considering logical or mathematical description of the monitored process. However, because of parametric, measurement and model uncertainties, applicable approaches that endeavor to locate faults with great accuracy are likely to give false alarms. Recently, many research works have been conducted in order to tackle this issue by making a tradeoff between accuracy and robustness during the fault detection phase. Due to the recent advances in sensor technology, computational capabilities and dedicated software/hardware interfaces, data-driven FD-HM approaches have demonstrated that highly accurate fault detection is possible when the system monitoring data for nominal and degraded conditions are available. Therefore, it seems that more than one approach is usually required for developing a complete robust fault detection and diagnosis tool. In this paper, the features of different model-based and data-driven approaches are investigated separately as well as the existing works that attempted to integrate both of them. In this latter context, there have been only few works published in the literature and hence reviewing and discussing them is strongly motivated by providing a good reference for those interested in developing hybrid approaches for FD-HM.
URL de la notice	http://okina.univ-angers.fr/publications/ua14973 [10]

DOI	10.1016/j.arcontrol.2016.09.008 [11]
Lien vers le document	http://www.sciencedirect.com/science/article/pii/S1367578816300669 [12]

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